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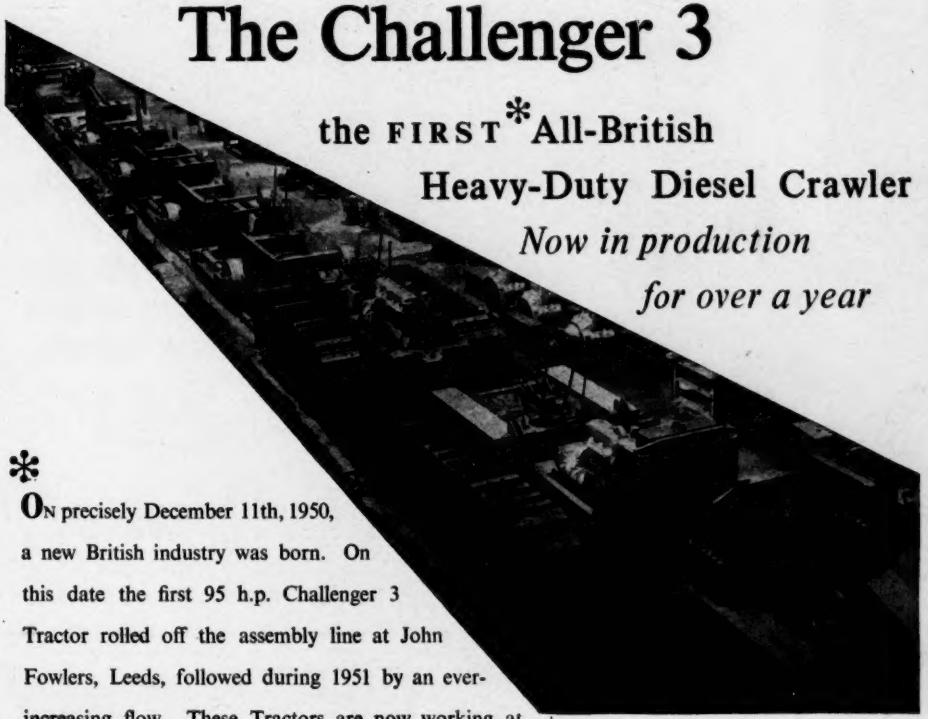
Challenger—News No. 2

The Challenger 3



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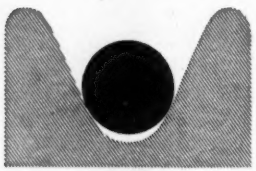
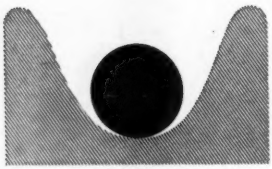
IF ROPE COULD TALK . . .

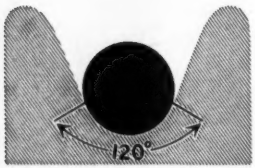
"Stop pinching me, you pulley!"



WRONG
Pulley groove too narrow



WRONG
Pulley groove too wide



RIGHT
Pulley groove correct—supporting the rope for 1/3rd. of its circumference

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CONTENTS

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NOTES AND COMMENTS

Southern Rhodesian Budget Helps Mining Industry

The Chancellor of the Exchequer and the South African Minister of Finance have both come under fire for the policies proposed in their respective Budgets towards the mining industry. But there is every likelihood that Mr. E. C. F. Whitehead, Finance Minister for Southern Rhodesia, will be spared this experience.

In his Budget statement at the end of last week, Mr. Whitehead not only proposed to grant a tax concession to mining companies to encourage dollar investment but also proposed that as from May 1, the whole of the Colony's gold output could now be sold on the free market instead of 40 per cent as hitherto.

The new tax concession takes the form of depletion allowances of 10 per cent for gold mines and 5 per cent for base metal and coal mines, the percentages being calculated on the value of the gross output and the allowance being limited to 50 per cent of the taxable income before charging depletion.

When explaining this proposal, Mr. Whitehead referred to the fact that provision exists in the taxation laws of both Canada and the United States for depletion allowances and the absence of this provision in the Colony's taxation code was a major deterrent to the investment of North American capital in the Colony's mines. This point had, he said, become clear over the past year during negotiations with various North American mining interests.

The tax concession is estimated to cost Southern Rhodesia approximately £250,000 in the current year, but it is hoped that an additional £180,000 will be recovered during the year from the imposition of a flat rate royalty of 4 per cent *ad valorem* on all base metal and coal outputs.

Mr. Whitehead proposed to raise income tax by 6d. to 8s. in the £ but company taxation remains unchanged except that, in future, recipients of bonus shares issued by companies revaluing their assets will not be liable to tax.

The tax concession together with the proposal to allow all gold produced to be sold on the free market should prove valuable to the Colony's leading producers. But they will not provide enough support for those marginal producers who, if their continued existence is to be profitable, would require a substantial subvention.

The decision to allow the whole of the Colony's output to be sold at premium prices is bound to strengthen current agitation in West Africa for the abandonment of the fixed 40 per cent maximum that can be sold on the free market. During 1951 Southern Rhodesia produced a total of 485,000 f.oz. and the Gold Coast 699,000 f.oz., so that should the West African gold mining industry be successful in following Southern Rhodesia's example instead of remaining wedded to the 40 per cent figure initiated originally by Mr. Havenga for the Union's gold producers, a further 1,184,000 oz. will be available for sale on the world's free markets. This in turn raises the question as to whether the free markets will continue to hold up if additional quantities became available or whether they would collapse. In the recently published report of the Union Corporation it was shown that out of a total world gold production in 1951 of 25,700,000 oz., as much as 18,300,000 oz. were absorbed into non-monetary channels, leaving only 7,400,000 oz. available to strengthen monetary reserves. Countries in the Middle East, India, and the Far East absorbed some 5,000,000 oz. for private consumption, while of the 13,300,000 oz. absorbed in the industrial arts it was estimated that 5,000,000 oz. were used for hoarding in the Western World.

Thus the maintenance of the premium price during the current year would appear to depend on the continued hoarding activities both in the Western world and in countries in the Middle, Near, and Far East. One of the chief sources of demand for gold for private hoards in the Western world has been France but recently M. Pinay's government have evoked more confidence from the electorate than has been in evidence for some years and consequently the French franc has also been more stable than for some time past, with the result that demand for gold as a hedge against inflation has fallen. On the other hand, hoarding also come about as a hedge against fear and while it cannot be said that the political and military situations in the Far East, in French Indo-China and Malaya are any worse than in 1951 they are certainly not much better and hence one of the essential conditions stimulating demands for hoarding remains.

Moreover, the total of gold available for monetary reserves during 1951, at 7,400,000 oz. is by far the lowest figure reached in the post war period and an upward trend in demand from governments may well come about in the current year which would lessen the supply available for sale at premium prices. Indeed, while some have averred that any further supplies of gold will kill the free market it must be remembered that this was an oft repeated refrain during the whole of last year. And although it is true that the free market price recently went as low as $37.25, it would be a rash prediction to deduce from this that in a short time the premium may disappear altogether.

Lessons of the Eppleton Colliery Explosion

Failure to maintain an adequate standard of ventilation at all times is referred to in the report by Mr. R. Yates, Deputy Chief Inspector of Mines (H.M.S.O., Cmd. 8503), as the root cause of the explosion at Eppleton Colliery, Durham, on July 6, 1951, in which nine men lost their lives.

The report states that at the time of the explosion, the electric machinery installed at the face consisted of one A.B. Universal arcwall coal-cutter, two Joy loaders, two shuttle cars and two portable drilling machines. Electric power was supplied from a sub-station in the district transforming from 5,500 to 500 v. A.C., and the battery-operated shuttle cars were served at an outbye charging station by two 7.5 K.V.A. rectifiers.

All the electrical equipment was up to British flameproof standards, or was intrinsically safe, except the Joy loaders and the shuttle cars which, however, carried the overall "Permissible Certificate" of the U.S. Bureau of Mines.

Mr. Yates adds that the moral of the explosion was that the use in safety lamp areas of all electrical apparatus not up to these standards should be stringently reviewed. He recommends that the principle of British standard flame-proof enclosure for all electrical equipment used at or within 300 yd. of the coal face in all safety lamp mines should be accepted, and everything done to conform to this standard as soon as possible.

The report also states that maintenance and repair of the two Joy loaders appeared to have deteriorated considerably, and it was not unlikely that latterly, at least, the cable entry was seldom being used in its designed flame-proof condition. Dealing with the use of fire-damp detectors, the report points out that the three detector lamps in the district at the time were found after the explosion at points remote from the working face where they were serving no useful purpose.

"I am aware," Mr. Yates continues, "that the indifference to these detectors has been a source of concern to colliery managers generally over many years, and it is high time this state of affairs was remedied. It is not unlikely that many explosions of varying magnitude which have occurred during recent years might have been obviated if proper use had been made at the time of this means of gas detection. I recommend that the National Coal Board should make a further endeavour to obtain a more reasonably minded approach by the men to this matter."

Another very important observation made by Mr. Yates in discussing the regulations governing the use of electricity in mines, which had been in force since 1913 and had served the industry well, is that amending regulations were long overdue "to bring the law into line with modern practice and to cope with ever-increasing mechanization with special reference to coal face machinery.

"In these days of progress and high efficiency the dictum should be accepted that where proper maintenance of equipment is of vital importance to ensure safety this can only be obtained where soundly constructed apparatus is installed at the outset. This has particular application to electrical apparatus installed in the vicinity of the coal face, and British standard apparatus ensures this position. Neither the Joy loaders, in their present form, nor the coal shuttle cars in use at this mine conformed to this desirable standard, which thus conduced to imperfect maintenance. By way of contrast, the arcwall coal-cutter machine, constructed to British standards and subjected to equally rough usage, was found to be in safe working order after the explosion.

"It is proper to record here that following this explosion, the National Coal Board have reverted to hand-hewing and loading at the face of the 'brokens' workings for the time being," states Mr. Yates in his Conclusion. "They have decided to veto the use of shuttle cars in 'brokens' or retreating longwall faces in future, and to accept a broad interpretation of general Regulation 132 [relating to risk of open sparking] until such time as amending electricity regulations come into force. Meanwhile, they will adopt as a long-term policy the modification of the foreign apparatus, now installed in their mines, to our flameproof standards. They have also effected a considerably improved design of adaptor for the main cable entry on Joy loader machines and a raised standard of supervision of the electrical apparatus, especially that employed at the coal face."

Portugal

(From Our Own Correspondent)

Oporto, April 10

A certain easing off is noticeable in the demand for wolfram ores and a distinct tendency towards price reduction. European consumers are holding back and U.S. buyers not very eager to quote. The long list of contracts closed last year at prices well above to-day's quotations are being implemented and will soon be cleared off. The result of a more or less uniform world price cannot fail to benefit the trade and stabilize market conditions here. So far as can be judged at the moment the second half of the year should show reductions in both wolfram and tin production—the inevitable effect of penal export duties and currency restriction measures.

The truth is that local exporters have taken a long time to realize that Portugal is not the only "pebble on the beach" and that other countries where a different mineral export policy is followed are also capable of turning out just those concentrates which Portuguese like to think are peculiar to their country. This is an attitude that can be ascribed to the boom conditions prevailing here during the war years.

The following are the export figures for February and the January figures for production:

Ores	*Exports*	*Production*
Wolfram	392 tonnes	386 tonnes
Tin concentrates ..	57 „	97 „
Cupreous pyrites ..	27,092 „	63,635 „
Manganese	350 „	—
White arsenic	182 „	—
Tin (metal)	0.45 „	—

It will be interesting to get the March export figures as the effect of the decree of February 27 did not affect the exports in that month. After a hold-up in shipments to European countries it is confidently expected that export licences will be issued once more. To what extent shippers can expect to be rationed is quite indefinite at the moment as the total tonnage applied for may be authorized or only a percentage.

Canada

(From Our Own Correspondent)

Toronto, April 7

There are strong indications that the long period of inflation came to an end in Canada at the close of 1951. The first quarter of 1952 ushered in an atmosphere of deflation in the minds of millions of people. The cost of food and clothing has been steadily declining. The number of unemployed has grown considerably. The Canadian dollar is rising in value and, in the opening week of April, commanded a premium of two per cent above the American dollar. This is believed to rate the Canadian dollar as the most highly valued currency in the world at this time. Capital appears to have decided that Canada is a reasonably safe haven in an unstable world. The resources awaiting development here and the strong evidence of political stability are serving as magnets. Factors already known are being re-emphasized, namely: in addition to being one of the greatest agricultural countries, the mines of Canada produce 70 per cent of the world's asbestos; there is more nickel produced in Canada than in all the rest of the world; the output of gold ranks among the three leading countries; production of petroleum is making the Dominion a leading Commonwealth producer; the development of new iron ore deposits is on the eve of placing the nation among the great steel producers; the rivers have been harnessed to the extent of 13,000,000 h.p. and with a further 40,000,000 h.p. still awaiting development; the forest resources are vast, and also the fisheries. These and other factors appear to be sufficient to excuse Canadians for feeling optimistic regarding the future.

GOLD PRODUCERS' NEW CONFIDENCE

Gold producers are gathering new confidence as they survey the evidence of declining commodity prices. Just as gold suffered by rising commodity prices, so also would the metal benefit through a decline. Every dollar saved as a result of lower costs is exactly one full dollar gained by the producer of gold. Because of this, close observers are watching the trend and, if deflation should gain serious scope, the captains of industry will be found casting covetous eyes toward the gold mining prospects again. Right now the tendency is to watch and wait—but to be prepared to change course should they find that the economic wind has really changed direction.

Already there are big gold mines in Canada. Kerr-Addison has a developed ore reserve carrying more than 4,000,000 oz.; Lake Shore makes no official estimate of ore reserves, but 3,000,000 oz. appear probable and Hollinger has more than 2,000,000 oz. in reserve. There is an additional large number of important gold producers—and the inference is that, in a new country where so much of the territory is virgin, the outlook is good for the development of many more important gold mines. One thing is sure and that is this: if difficult times should ultimately develop in the aftermath of wars and preparation for war, the gold mining industry of this country may well become one of the greatest assets of this nation.

Iron Ore Company of Canada will resume exploration of the iron ore deposits in the Labrador-New Quebec region on a large scale this year. The company has earmarked $2,000,000 for exploration, diamond drilling and mapping, to be spent mostly on the Labrador concession.

The speed-up of the construction programme has worked out very well and the company is now assured of the completion of the Labrador railway by the end of 1953. That means that iron ore shipments will go out over the full shipping season of 1954.

Last year, mine work was largely concerned with definition of known ore bodies and preparing production layouts for the deposits that will be mined first. Nevertheless some exploratory work was done and one major new ore body was located. The programme for this season will be concentrated on a 50-mile long area, lying some 75 miles south-east of the main base camp at Knob Lake where the ground is heavily overburdened so that prospecting will be largely a matter of diamond drill exploration.

ORE RAILWAY COMPLETION ONE YEAR AHEAD OF SCHEDULE

As regards the railway to the iron fields of Labrador and Northern Quebec, it is anticipated that by the middle of May track laying will be at a rate of one mile per day and it is expected to have 190 miles of track laid by the end of this year. The construction work will continue through the winter and into 1953 in order to complete the road by the end of that year, a full year ahead of the originally planned schedule.

A stupendous transportation job is involved in maintaining construction work. The company operates 15 aircraft and last year transported 33,000,000 lb. of freight and 22,000 passengers.

When completed, the railway will be one of the most up-to-date on the North American continent. Diesel engines will haul the ore cars, each carrying 90 l.tons. Expenditure to date amounts to $55,000,000 and 95 per cent of this has been spent in Canada. Current expenditure is at the rate of $1,000,000 a week.

The decision of President H. S. Truman to leave the White House at the end of his present term has reduced the prospects of the government of the United States joining with Canada in the development of the St. Lawrence River and Great Lakes deep sea waterway this year. Since Mr. Truman announced his intentions there has been no official comment from Ottawa on the project.

Pulp and paper mills in Canada have expanded to a stage where over 3,000,000 h.p. is required in their operations—about 24 per cent of the total hydro-electric installations in Canada. In 1951, new hydro-electric installations amounted to 881,000 h.p., and with indications that hydro-electric developments will continue to grow rapidly—an annual increase to 1,000,000 h.p. being in early prospect.

More than 80 per cent of the motive power employed in metal mining, smelting, and refining Canadian ores is provided by hydro-electric power plants. The potential of some 40,000,000 h.p. still running to waste in the rivers of this country may be expected to be brought into service accordingly as industrial expansion takes place. Generally speaking, provincial and federal governments recognize the fact that cheap power development should precede rather than follow industry, thereby acting as a stimulant to industrial development.

A glance at the record is sufficient to illustrate the extent of growth taking place. For the year 1945, the metallic output in Canada was valued at $316,962,810, whereas the production during 1951 was valued at $732,771,290. Likewise, the mineral fuels produced in 1945 had a value of $93,531,276, compared with an output of $237,957,287 during 1951. Also, the output of non-metallics, clay products and structural materials registered similar growth. The net result was that all minerals produced in Canada during 1951 had a value of $1,228,005,479, compared with just $498,755,181 in 1945.

Inco's New Conveying System for Creighton Nickel Ore Concentrate Tailings

The tall stilts of a wooden trestle more than seven miles long, marching across the outcrops, bush and muskeg of typically rugged Northern Ontario country, carry the bulk concentrate produced at International Nickel Company's new 10,000-ton Creighton concentrator (full details of which appeared in *The Mining Journal*, Dec. 14, 1951) to the company's reduction plants at Copper Cliff. It is believed to be the first time that concentrate pulps have been piped in such quantity over such a distance.

The artery through which the Creighton concentrate is pumped to the heart of Inco's reduction operations becomes part of the elaborate system which also carries tailing, or waste material, from both Creighton and Copper Cliff mills to the 1,100 acre disposal area located midway between the two plants. The system has 12 miles of trestle, at some points 65 ft. high, and contains 3,000,000 board ft. of lumber and 40 miles of wooden pipe. It now transports as much as 30,000 tons of material in one day.

HANDLING CREIGHTON CONCENTRATE AND TAILING

When the decision was made to build the Creighton concentrator as part of the company's $130,000,000 programme of conversion to all-underground mining, steps were immediately taken to investigate the possibility of pumping the concentrate to Copper Cliff. To simulate actual operating conditions, an 8 in. wood stave pipe line, 4,000 ft. long, was installed at Copper Cliff and means were provided for circulating through the line concentrate pulps of varying densities from the 30,000 ton Copper Cliff mill. Information obtained from these tests pump capacities, e.g., head loss due to friction, maximum and minimum pulp velocities, etc., demonstrated that concentrate could be pumped a pipe line distance of 7½ miles from Creighton to Copper Cliff with five relay pumping stations. Since three stations had to be built for Creighton tailing disposal, they were designed to allow for concentrate pumping also; two of the stations already in service to handle Copper Cliff tailing were enlarged to complete the facilities required for pumping the Creighton concentrate.

The four miles of new trestle from the Creighton plant carries two 8 in. concentrate pipe lines, two 13 in. tailing lines, a 6 in. water line enclosed in an insulated wooden box, and a walkway. The lines are all wood-stave pipe; those for concentrate and tailing are tested for 110 lb. per sq. in. pressure and the one for water at 75 lb. per sq. in. From the point in the disposal area where Creighton tailing is dumped, the concentrate lines are installed on existing Copper Cliff tailing trestle for the remainder of the 7½ miles to the reduction plants. For fire protection on the new trestle, corporation cocks for a 1½ in. fire hose are inserted in the water line every 600 ft., and fire hose is provided in boxes along the line. The complete system is patrolled four times every eight hours.

The trestle extending from Creighton was built with a minimum 0.75 per cent slope to and from each pumping station so that the concentrate lines would be self-draining in case of power difficulties. All concentrate from drainage is collected at each station in a spill sump which will hold three complete drainages from the concentrate lines. From the spill sump, the drainage is pumped into the concentrate sump for return to the pipe lines.

Drainage from the tailing lines is arranged through quick dumping valves situated a short distance on either side of the stations.

FIREPROOF PUMPING STATIONS

Of concrete, steel, and cement block construction, the pumping stations are completely fireproof. Sumps to receive tailing and concentrate pulps form one wall of the building. Three 8 in. by 6 in. pumps for concentrate and three 10 in. by 8 in. pumps for tailing, all rubber-lined, are installed in a straight line. Auxiliary gland water pumps and a vertical clean-up pump in the concentrate drain sump complete the installation. (See illustration on p. 417, col. 1.)

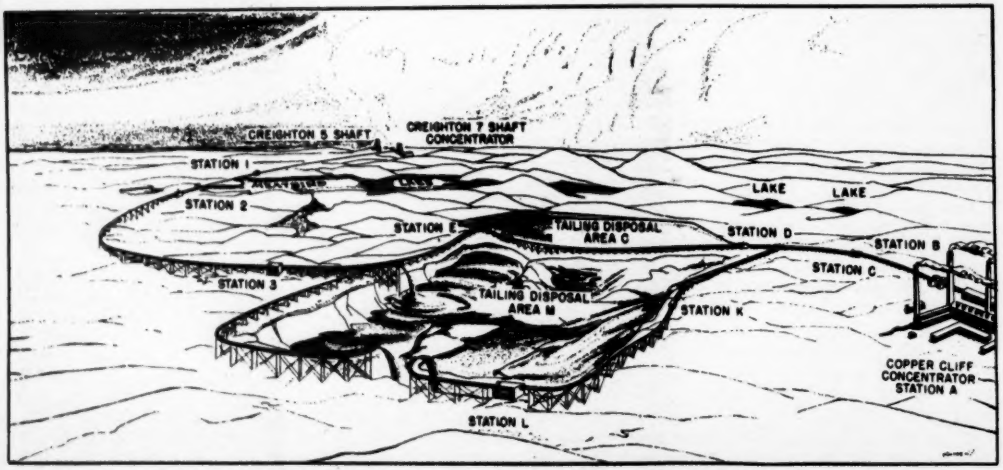


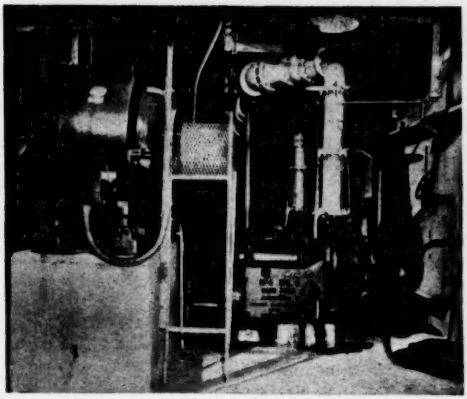
Diagram showing how Creighton Concentrate and Copper Cliff and Creighton Tailings are conveyed

The specific gravity of the concentrate and tailing pulps varies with the mill tonnage; pipe line velocity and volume handled must remain reasonably uniform. When milling 10,000 tons a day, approximately 1,800 tons of concentrate and 8,200 tons of tailing are produced. Under these conditions, the concentrate pulp has a specific gravity of 1.28 with a flow of 800 g.p.m. The 8 in. x 6 in. concentrate pumps are designed so that one pump will handle this flow through one 8 in. line with a velocity of 5.11 ft. per sec. Original test work showed the line loss due to friction when pumping 600 to 800 g.p.m. to be 17.5 ft. of head per 1,000 ft. of pipe. The longest concentrate pumping stage is a distance of 9,700 ft. where the static head is minus 49 ft. The tailing pulp has a specific gravity of 1.35 with a flow of 2,500 g.p.m. The 10 in. x 8 in. tailing pumps are designed so that one pump will handle this flow through one 13 in. line with a velocity of 6 ft. per second; the loss in head due to friction in the line approximates 10 ft. of water or pulp per 1,000 ft. of line.

The complete pumping system has been designed for trouble-free operation despite the rigorous northern winter weather. Several times the temperature has ranged to 30° below zero with no operating difficulties.

DISPOSAL OF COPPER CLIFF TAILING

Tailing from the main concentrator at Copper Cliff, amounting to more than 500,000 tons per month, is collected in a central sump and pumped 1,200 ft. from the mill to five thickeners 110 ft. in diameter and 12 ft. deep. The pulp is thickened from 33 per cent to 50 per cent solids, the clear overflow water returning by gravity to the mill. The thickened pulp is then pumped 5,000 ft. to C station of the disposal system, from where it is relayed through pumping stations located around the perimeter of the disposal area. Four of these stations are expendable and must be relocated as the elevation of the disposal area is raised. (See illustration in col. 2.)

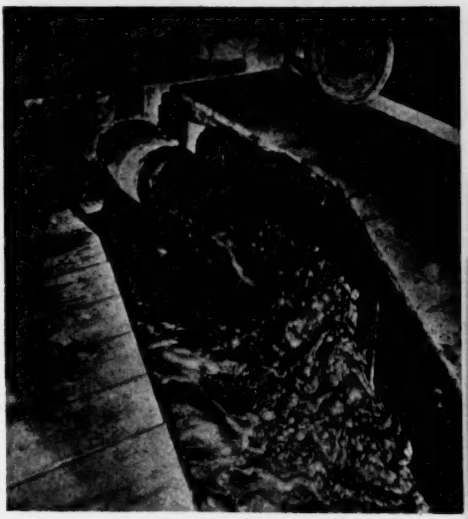


A battery of pumps in one of Inco's three new pumping stations at Copper Cliff

Between the hills around the edge of the tailing area dams have been built with tailing sands spigotted from the bottom of the wood stave pipes. Clear water from the tailing disposal area overflows through a reinforced concrete chimney, 5 ft. square, located in the lower elevation of the tailing area, and, after passing through a 1,400 ft. tunnel in a solid rock outcrop, travels to a storage area for use by Copper Cliff concentrator. (See diagram.)

The tailing lines are 16 in. wood stave pipe. They are installed with a minimum 0.50 per cent slope to allow for line drainage through quick dumping valves located at low points. Pumping stations are equipped with rubber-lined pumps, where water is available for gland sealing, and with steel-lined pumps in other locations.

Specific gravity of the thickened tailing pulp from Copper Cliff is 1.48. When milling 30,000 tons per day



Creighton mine tailing arrives at one of Inco's pumping stations en route to disposal area near Copper Cliff

approximately 4,500 g.p.m. is pumped through the line with a velocity of more than 7 ft. per second. The head loss due to friction in the pipe line is somewhat over 10 ft. of pulp per 1,000 ft. of pipe.

Another extensive pipeline project necessitated by the construction of the new mill at Creighton was the laying of a water line from the Vermilion River, six miles to the west. A pumping station was erected at the river and a 20 in. continuous wood stave pipe, built stave by stave in the field, was laid to a booster station built at Creighton.

Inco's New Smelting Furnace

The completion of a special type of smelting furnace and auxiliary equipment which will use oxygen for the flash smelting of copper concentrates in place of smelting with pulverized coal, is a major result of the research work carried out by the International Nickel Co. during 1951. As part of this project, a plant for the production of oxygen was also completed.

This combined unit, which was under experimental operation by the year-end, is, according to the company's annual report, designed to provide economies through the curtailment of costly coal requirements and to make possible the greater utilization of sulphur from smelter gases. The rich sulphur-containing gases from the new process will be employed in the large-scale production of liquid sulphur dioxide, a product which has significant potential demands and of which there is no other domestic production in Canada. They will be supplied to Canadian Industries Ltd. for conversion into liquid sulphur dioxide in a plant which is now being erected at Copper Cliff.

Cryolite—Its Properties and Uses

By R. H. WARRING

The following article contains a survey of the occurrences, properties and manifold industrial uses of cryolite—an interesting mineral which was, at one time, the only source of aluminium.

Employed on a fairly wide scale by the metallurgical and ceramic industries, the mineral cryolite has, during the past two decades, also established itself as an insecticide, a filler for rubber and paper compounds, an abrasive, a pigment, a catalyst, and a useful additive in many other fields. It has, for example, even been used as a constituent in solid fuel rocket propellents, on account of its cooling effects.

Cryolite is, in fact, a unique mineral. It has been known to commerce for roughly a century, but from the beginning only one known source has been worked on a commercial scale. This is at Ivigtut, situated on a fjord on the western coast of Greenland, where cryolite occurs as a pegmatitic vein in granite, associated with galena, pyrites, silica, topaz, fluorspar and some fifty other minor minerals. Granite and hornblendic gneisses are the underlying rocks of the area.

The Eskimo population in the region have mined cryolite and its associated minerals since the beginning of their history, using the raw materials for their simple crafts. The first survey of the deposit by a European was made in 1806. Two years later, the first mineralogical samples were exported to Europe, but it was not until 1837 that a commercial use for cryolite was first suggested. This was in the manufacture of soda or caustic soda and, somewhat later, alumina—the principal uses of the mineral during the latter half of the nineteenth century. By that time the salt process for the manufacture of soda and caustic soda had been established and bauxite replaced cryolite as the chief source of alumina. However, cryolite still retained its close association with the production of aluminium by the Hall-Héroult process where fused cryolite serves as the electrolyte in the electrolytic reduction of aluminium metal from the pure oxide (alumina).

IMPORTANCE OF GREENLAND DEPOSITS

Mineral rights in the Ivigtut mine have been owned by Danish companies since 1860. The present operators are Kryolitselskabet Oresund A/C, shipping crude ore to both Europe and to the U.S. No other similarly large deposit is known; but there are occurrences also in Colorado and in Russia: Greenland, in other words, is virtually the sole source to meet the world's demands for cryolite ore. In view of the importance of cryolite in the Hall-Héroult process for the production of aluminium alone this would appear to make Greenland a country of strategic interest and the Allies did, in fact, enter it shortly after the outbreak of the last war, in 1940. However, cryolite can be synthesized so that non-important countries are not unduly handicapped by lack of the natural mineral. The cost of such cryolite is higher than that of the natural mineral, but although geological studies show that the Ivigtut cryolite reserves are adequate for all foreseeable needs for many years to come, the diversity of the applications of the mineral and its many obvious advantages in so many industries may encourage the development of more synthesizing plants as a long-term policy.

Cryolite is a double salt of aluminium fluoride combined with sodium fluoride, known chemically as sodium aluminium fluoride or sodium fluoaluminate. Its chemical formula is $Na_3Al\ F_6$. It occurs naturally in monoclinic form, the crystals often being massive and occasionally with a lamellar structure. The fracture is uneven and brittle.

Pure cryolite is colourless and has almost exactly the same refractive index as water. Immersed in water it has the appearance of clear ice, hence its name, which is derived from the Greek, meaning icestone. Natural cryolite generally ranges in colour from "ice" to snow white—from transparent to translucent, with a vitreous to greasy lustre. Combined with impurities, other specimens may range in colour from red to dark brown, or even black.

When heated, cryolite undergoes a reversible transition at 560° to 570° C., changing to pseudo-cubic form. It melts at 1,000° C. with marked increase in volume on fusion (roughly 40 per cent increase over solid volume). Its specific gravity in solid form (2.95 to 3.00) decreases to 2.095 when fused at 1,000° C. The fused mineral then expands very slightly with further increase in heat corresponding to a reduction in specific gravity of approximately 0.05 per 50° C. Its thermal stability, melting point and favourable specific gravity, coupled with its affinity to absorb alumina in solution are major factors in the production of aluminium metal by the electrolytic process.

Cryolite can be melted repeatedly in the absence of air or water vapour without change in composition. Some decomposition takes place when melted in moist air with the liberation of hydrogen fluoride. The extent of this decomposition depends on the amount of water vapour present, the temperature and the catalytic effect of any impurities.

Fused cryolite reacts directly with more electro-positive metals liberating aluminium. This property was, in fact, used as a basis for the commercial production of aluminium metal in the middle of the nineteenth century. The electro-positive metal used was pure sodium and production costs were naturally high. This process was entirely superseded by the Hall-Héroult method. The property that cryolite can be reduced in this manner is, however, still employed for the removal of metallic magnesium in the refining of scrap or secondary aluminium.

The original aluminium manufacturing method is shown in the following formula:

$$Na_3Al\ F_6 + 3\ Na = Al + 6\ NaF$$

If cryolite is allowed to react with a mixture of aluminium and magnesium (as in scrap), the magnesium content is reduced to the fluoride:

$$3\ Mg + 2\ Na_3Al\ F_6 = 2Al + 3\ MgF_2 + 6NaF$$

CRYOLITE IN THE METALLURGICAL INDUSTRY

Cryolite has numerous other uses in the metallurgical field—as a flux, as degassing agent (aluminium alloys), as carrier, etc. It has also been used as an effective substitute for sodium fluoride in the production of steel castings of a special kind where the skin is almost pure iron and the core semi-porous. Its solvent action on alumina also makes the mineral useful in the manufacture of high tensile and killed steels. This solvent power is maintained with most light alloy oxides, hence its power as a flux in the soldering or welding of aluminium and aluminium alloys, etc., or fo accelerating any reactions where the presence of such a oxide retards the process or is harmful to it.

Its excellent properties as a flux are also utilized in the ceramic industries, particularly in the production of glass

and enamels. The use of cryolite with soda-lime-silica glasses results in a lowering of the softening point and an increase in the working range of the glass. Cryolite can also act as a decolorizing agent. It is regarded as superior to other fluorine compounds used in similar capacities. As regards stability, natural cryolite is considered to be better than synthesized cryolite.

In quite another field, cryolite has been used in large volumes as an insecticide for a wide range of crops. It is generally used either as a dust, with some 30 to 60 per cent of diluent, or as a water spray containing 3 to 5 lb. of cryolite per 100 gallons of water. Cryolite is virtually insoluble in water (0.04 per cent at 25° C.) and so the latter is more truly a suspension of fine cryolite in water.

CRYOLITE AS INSECTICIDE

It was first used as an insecticide on a commercial scale in 1932, when it was employed as a substitute for arsenical sprays on apple trees in Western America. It possesses the advantage of being considerably less poisonous than arsenical or other fluorine compounds as far as vertebrate animals are concerned, but is almost equally effective as an insect poison. It has been shown to be more effective than DDT on sugar cane treatment and also acts as a detoxifying agent on soils which have become contaminated by previous use of lead arsenate.

NUMEROUS OTHER USES

The other uses of cryolite are so numerous that only a few can be mentioned in conclusion. For instance, it has given satisfactory use as an abrasive, particularly in the manufacture of rubber- and resin-bonded abrasive wheels; it is used as a filler in proportions up to 10 per cent, forming a bond more resistant to heat and wear, giving faster cutting and a cooler grinding action and preventing metal build-up on the wheel. In finely powdered form, cryolite has also been used as a polishing paste or powder. In the lighting industry, cryolite has been used to reduce the blackening effect which takes place on the glass envelope of a tungsten filament bulb as its age increases, and in dielectric coatings for electrical discharge units. In explosives, cryolite is an ingredient of flashless cordite and in powder metallurgy, it has been used as a sintering bath in the production of bearings and similar components from metal powders.

Phosphate Mining in Curaçao

In the notes on "The Caribbean Basin Revisited" in our issue of April 11 no mention was made of the actual mining operations carried on in the island of Curaçao at the phosphate quarries of the Mijnbouwmaatschappij Curcaçao N.V. The following is a very brief description of this interesting and unusual undertaking.

On the south side of the Tafelberg, a hill some 600 ft. high with a flat top, near the eastern extremity of the island of Curaçao, there exists a considerable deposit of tricalcium-phosphate which has been exploited to a greater or lesser extent since the year 1875. There seems little doubt that at one time the shelf upon which the phosphate is found, now some 300 ft. above sea level, was at one time at sea level and was the roosting place for vast flocks of the guano birds which still exist on the west coast of South America. The guano deposited by those birds was probably leeched down by rainfall, etc., into the underlying limestone and formed the deposit of tricalcium-phosphate which is worked to-day.

The property was originally worked by Mr. John Godden, an enterprising and industrious mining engineer who, prior to his working the Curaçao deposit, had considerable experience in the working of other phosphate deposits in the West Indies group. The present company, the N.V. Mijnbouwmaatschappij Curaçao, a joint English-Dutch organization, took over the operation of the property in 1913 as a result of disagreements between the previous owners, and has operated it steadily ever since, except for minor shutdowns during war periods.

U.S. ABSORBS ENTIRE OUTPUT

Until 1945, most of the production from the quarries was absorbed in Europe, where it was converted into superphosphate for fertilizing purposes. It was, indeed, a fortunate happening for the company that at a time when, owing to the exhaustion of the richest parts of the deposit, they would have found it almost impossible to maintain the grade at which they had previously shipped, a firm of U.S. phosphate importers became interested in Curaçao phosphate for cattle feed. This firm gradually purchased more and more of the company's production until at the present time it is taking the entire production of the quarries—some 100,000 tons per annum. Its low fluorine content, which varies between 0.35 per cent and 0.50 per cent, is the principal reason for the high market value of Curaçao phosphate to-day; whereas phosphate from most other producers in the world has to be put through a costly process of defluorination before it can be embodied in cattle food, Curaçao phosphate can be finely ground and directly admixed without the necessity of carrying out any treatment.

The phosphate deposit is, as previously stated, some 300 ft. above sea level and about three-quarters of a mile inland from the coast. The ore, which is brought down by normal methods of drilling and blasting, is hand-dressed in the quarries and then loaded into mine cars which, in trips of twelve, are run down a self-acting incline by means of which the twelve descending full cars haul up an equal number of empty ones. The rock is taken to the crusher plant situated on the sea-shore where it is crushed to 2½ in. size and then stored. Ships can tie up directly opposite the storage plant and are bulk loaded by means of a cantilever conveyor belt capable of loading 1,000 tons or more per day of eight hours.

TWO PROFITABLE SIDE-LINES

The company operates two other profitable side-lines as by-products from its phospate operations: a limeplant and a stone-crushing plant. The purest limestone which is worked in conjunction with the phosphate in the quarries is burned in the lime plant and produces a very pure grade of hydrated lime, most of which is absorbed by the Shell Company for use in the big oil refinery on the island. A large proportion of what would otherwise be waste stone is passed through the stone crushing plant which is served by a second self-acting incline from the quarries, the crushed stone finding a ready market for the manufacture of roads concrete blocks and construction purposes in general.

The extent of the phosphate deposit on the Tafelberg has never been fully explored and at the present time a programme of core drilling is being carried through for the purpose of making this estimate. Present indications are that the company has reserves which will last for some years to come.

British Industries Fair 1952

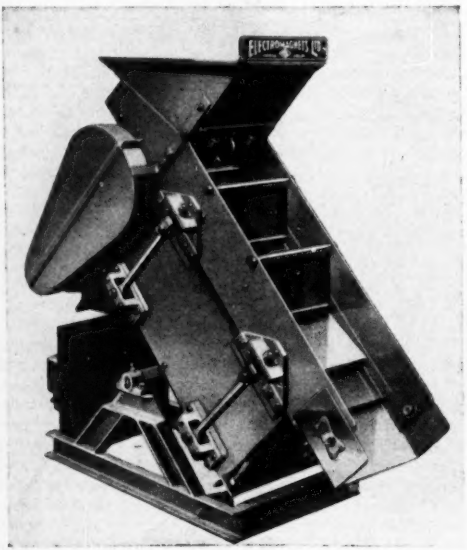
As in former years, the Commonwealth Section of the 1952 British Industries Fair, which opens in London and Birmingham (Castle Bromwich) on May 5 and closes on May 16, will attract much attention from overseas business representatives and U.K. visitors alike. The displays staged by the Commonwealth countries at Earl's Court will not only show raw materials, minerals included, but also the products of their rapidly expanding manufacturing industries.

As regards the major mineral producing members of the Commonwealth, the Gold Coast will have three special displays devoted to the mining industry, showing gold, manganese, diamonds and bauxite. Specimens of copper, iron pyrites, asbestos, and gypsum will be on view on the Cyprus stand. Of special interest will be an exhibit, on the British West Indies stand, of Jamaica's bauxite industry—the first time that this relatively new branch of the island's economy has had an individual exhibit. The mineral resources of Nigeria will be featured on that Colony's stand, and Sierra Leone, too, will display minerals. An interesting exhibit on the Canadian stand—the theme of which is the encouragement of British manufacturers to expand their business in Canada—is devoted to important projects under way, including the new Kitimat aluminium scheme and oil developments.

Electromagnets Ltd.

Electromagnets Ltd., Boxmag Works, Bond Street, Birmingham, 19 (Stand No. C.605, Castle Bromwich), will show a comprehensive range of exhibits, including a lifting magnet, swarf separator, high intensity chute type magnetic separators and various types of permanent magnetic separators.

An exhibit of particular interest will be a fully enclosed version of the recently developed Boxmag super intensity



The high intensity heavy duty agitated chute separator made by Electromagnets, Ltd.

electromagnetic conveyor head unit built into a short band conveyor unit. This magnetic head (Patent applied for) has an intensity of magnetism three or four times greater than that of a pulley or drum of comparable diameter.

A high intensity heavy duty agitated chute separator, of the electromagnetic type, for the removal of fine iron, feebly magnetic oxides and the like from powders and similar products which require agitation to ensure a free flow is also bound to attract attention. The new coil systems give a separating power greatly in excess of that obtainable from previous magnetic chutes of this basic type.

Prototypes of new permanent magnetic separators greatly exceeding in strength any permanent magnetic separators available will also form an important exhibit.

Goodyear Tyre & Rubber Company

Demonstrations of the maintenance of quality control in the manufacture of Goodyear conveyor belts and hose will be the principal feature of the stand of the Goodyear Tyre and Rubber Co. (Stand No. D212, Castle Bromwich). Each of the company's three main groups of products—Conveyor Belting, Wrapped Ply Hose and Braided Hose—will be included in this demonstration by means of a series of transparencies. Each panel will show a stage of manufacture, a close-up of the test applied at that particular stage, and some explanatory copy as to what is being done and why.

The centre piece on the stand will show the range of Goodyear Conveyor Belting, which is extensively being used in both U.K. and overseas mines (see *The Mining Journal*, March 14, 1952). This range will be flanked at the left by a model of Goodyear rayon "V"-belt and mounted examples of Goodyear cord "V"-belt. On the right of the central display will be an enlarged cut down section of Goodyear hose treated in a similar manner to the Goodyear rayon "V"-belt. Goodyear Endless Cord Transmission Belt, with rolls of other types of Goodyear Transmission Belting, will also be displayed.

British Ropes Ltd.

A novel form of construction has been adopted by British Ropes Ltd., for their stand (No. D.351/246, Castle Bromwich): the whole of the office has been slung clear of the ground and is suspended on four of the company's own steel wire ropes. Entrance to the office is gained by a short stairway which is also suspended by slender wire ropes. The work of the company's Technical Service Department and the types of instruments used to test ropes *in situ* will be displayed. Tests have been carried out by the company's engineers in many parts of the world and, as an example, its reports include one on the shallowest shaft in the world and another on the deepest mine in the world. The first was an investigation of winding rope conditions in Furnace Hill Colliery near Chesterfield where shaft depth is only 144 ft. and the weight of rope involved is only 4 cwt. By contrast, at the South Deep shaft at the Simmer & Jack Mines Ltd. in South Africa, the shaft depth was 6,419 ft. and the weight of rope involved was 24.9 tons.

The Tudor Accumulator Co., Ltd.

Covering almost the entire field of storage battery applications in industry, the exhibits of The Tudor Accumulator Co., Ltd., 50, Grosvenor Gardens, London, S.W.1 (Stand No. C.114, Castle Bromwich), will include a switch-tripping unit, a "Safetylyte" automatic emergency lighting set and a range of cells for all stationary and traction duties. The "Safetylyte" section will feature an equipment consisting of a control cubicle and battery of 14 sealed-in Plante type cells typical of many hundreds supplied to any building where sudden darkness could spell confusion or danger to life.

G. A. Harvey & Co. (London) Ltd.

The main exhibit of G. A. Harvey & Co. (London) Ltd. (Stand No. B.329, Castle Bromwich), is the Ellipsoidal Spun Head which was exhibited outside the Dome of Discovery at the Festival of Britain. This "Rotarprest" head is 12 ft. 6 in. dia., 3 ft. 6 in. deep, and was designed for a pressure vessel to withstand 270 lb. sq. in. working pressure.

The British Thomson-Houston Co., Ltd.

The main feature of the British Thomson-Houston Co.'s stand (No. C.511/410, Castle Bromwich), will be a correctly scaled reproduction of a 62,400 k.V.A. vertical water-wheel alternator—an appropriate background for the display of B.T.H. electric equipment for industry ranging from switchgear for industrial power distribution to Mazda lamps and lighting for all industrial applications.

The company's activities in the industrial rail transport field will be illustrated by photographs of Diesel-electric locomotives from 165 h.p. upwards for shunting duties and by a scale model of a 1,000 h.p. Diesel-electric shunting and transfer locomotive. Ten of these locomotives are on order for the New South Wales Government.

Squirrel-cage and slip-ring induction motors in various sizes are also exhibited, five of the squirrel-cage machines having die-cast frames and endshields.

In order to meet widespread demand for interchangeability of motor dimensions, British Thomson-Houston, in conjunction with other leading British manufacturers, has developed a new range of squirrel-cage motors with standardized fixing dimensions. The range is designated K.N.B. and covers machines up to 20 h.p. An important aspect of this design is that although a compact arrangement has been maintained in accordance with accepted British practice, it is possible to supply type K.N.B. motors to American N.E.M.A. standards by the use of a larger frame size and slight modifications to the shaft. This means that mechanical interchangeability with U.S. or Canadian built machines is a simple matter. One of these motors is shown as sectioned working exhibit.

Several exhibits recall the important part the company has always played in developing industrial processes and the stand displays a photo-electric counter and sorter and a 25 kW. H.F. induction heater demonstrating the hardening of tool-steel.

As regards Mazda lighting equipment, new fittings for industrial and street lighting applications will figure prominently among exhibits on the B.T.H. stand. Fluorescent fittings are chiefly represented by the already well-known group of reflector, bare-lamp and louvered units, forming the Mazda standard range. The Mazda industrial flameproof fitting, which is certified for safe operation in most of the gaseous atmospheres met with in mining and industry generally, will also be on show.

One of the most important lighting exhibits is the latest Blended Light fitting. This is particularly versatile in that it makes possible a number of combinations of mercury and tungsten components. The fitting comprises a tungsten component and one or more mercury components together with control gear for the mercury vapour lamps, all pendant from the control box. It is thus possible to obtain different colour values and varying intensities, depending upon the particular application.

Keith Blackman Ltd.

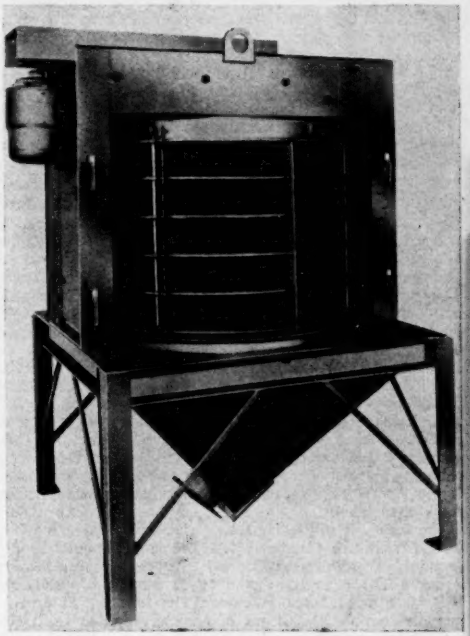
Exhibits shown by Keith Blackman Ltd., Mill Mead Road, London, N.17 (Stand No. D.755/6554, Castle Bromwich) will include the Tornado No. 27 Centrifugal Fan for handling relatively large volumes of air or gases at low and medium pressures; the Tornado No. 12 Centrifugal Fan (belt driven), with air cooled bearings which can handle air or gases at temperatures up to 1,000° F., and the Tornado 36 in. Type 9 Cast Iron Blower; designed to handle 4,500 c.f.m. against a resistance of 31 in. twg., suitable for gas boosting, cupola blowing and oil pressure charging. Also on view will be the Tornado W.1100 Wet Type Dust Exhausting and Collecting Unit. This completely self contained unit has been designed for the collection and settlement of industrial dusts, injurious to health, or capable of causing fire or explosive hazards.

Chloride Batteries Ltd.

Chloride Batteries Ltd., Exide Works, Clifton Junction, Manchester (Stand C.301, Castle Bromwich), will display a group of illuminated panels showing the many types of electric truck available and the duties they are capable of tackling. On a plinth beneath this feature will be a selection of typical Exide-Ironclad batteries, an important source of power for electric trucks and vehicles of all kinds. Another section of the stand will be devoted to Keepalite, the original automatic emergency lighting apparatus and there will also be examples from the range of Exide-Ironclad, Exide and Drydex batteries.

Nordberg Manufacturing Co.

The Nordberg Manufacturing Co. (Stand No. 1103/1002, Castle Bromwich), which appears independently for the first time at the B.I.F., exhibits an entirely new type of screen. In design and principles of operation, the new Symons "V" Screen differs widely from the more conventional types of vibrating and rotary screens. It consists essentially of a screening surface in the form of a vertical cylinder or drum, which is simultaneously rotated and gyrated. A cupped feed plate with radial vanes is located a little below the upper edge of the drum;



The Nordberg Manufacturing Company's new Symons "V" Screen

material fed on this feed plate is thrown out against the inner surface of the drum, and the undersize is passed through the screening surface by the centrifugal force generated by rotation. Using 14 gyrations to one drum rotation, each gyration of the drum produces an inward deflection of the material being screened. This frees the holes in the screening surface for the passage of undersize at the next contact and permits the material to drop a short distance. The timing is such that the material contacts the drum and is deflected inwardly once each gyration during its downward travel.

The screen, which can be supplied with totally enclosed housing, is at present built in one size only, 3 ft. high and 12 ft. in circumference, thus making a total screening area of 36 sq. ft. Designed principally for one separation at fine mesh apertures, it is equally suited for wet or dry jobs.

Other exhibits will be Symons 22 in. Intermediate Cone Crusher, a machine which supplements the Symons Standard and Short Head Cone Crushers; the Symons Vibrating Bar Grizzly, developed by the company for heavy duty operation in mines, quarries, cement works, etc., where it is necessary to scalp or make rough separations, and the Symons Rod Deck Screen which has a screen surface composed of rods instead of the woven wire mesh or perforated plate so commonly used as a screening medium. The individual spring steel rods are sprung into place and held in position by moulded rubber spacers. This patented screening surface is especially adapted to handling feeds of wet, sticky and clayey ores on comparatively small openings. While the greatest field for the Rod Deck Screen is for mine screening, it is also applicable wherever sizing is not confined to square openings.

METALS, MINERALS AND ALLOYS

Metal markets in all parts of the world still report very slack conditions, with free market prices continuing to ease. In the States, despite the recent loss of steel production, the D.P.A. forecasts a substantial relaxation on steel and aluminium controls by the end of this year, although as reported below the copper position is no easier.

The battle over the U.S. Government's seizure of the steel industry has been continued this week in the Senate, with a Republican attempt to legislate against the use of Government funds to run the industry. Meanwhile, the Government has approved an increase in steel prices of nearly $3 a ton, this is about a quarter of what the companies have said they would need to meet the W.S.B. wage increase proposals. There has also been some talk of the Government increasing wages in the industry, although earlier it had been stated that no increases would be countenanced until agreement had been reached between the steel companies and the union.

COPPER.—The Chilean Government has proposed alterations in the taxation of Chilean copper companies. Instead of compelling the companies to sell dollars received from the sale of copper at the artificially low rate of 19.37 pesos, the government will permit the sale of dollars on the free market. This proposal is accompanied by another which fixes taxation at 50 per cent of profits plus a sliding scale tax which would begin at 17.3 per cent of profits and diminish until it finally disappeared when present production had been doubled.

Mr. Manly Fleischmann, D.P.A. Administrator, still maintains that the worst of the copper shortage is not over. Admittedly, the ending of the Korean War would eventually ease demand, but military requirements would continue at least as large as at present. "Claimant agencies" had requested for the third quarter of the year an amount equal to 141 per cent of the amount available; this was less than the 151 per cent asked for in the second quarter, but it also meant severe cuts for many agencies.

The R.F.C. is still taking a long view over copper supplies, for it is considering lending $11,288,000 to San Manuel Copper (a subsidiary of Magma Copper) to open a copper field in Arizona. The mine is believed to be capable of producing 10,000,000 tons of ore each year. The loan would provide facilities to mill 30,000 tons of ore daily and to smelt 800 tons of concentrates each day; it would also provide for public services. After four years the annual output is expected to be around 70,000 s.tons of copper and 3,000 tons of molybdenite. The Government's advisers have declared the venture to be both feasible and essential.

Mr. Strauss of American Smelting and Refining has told shareholders at the annual meeting of plans to develop in Peru what may be one of the great copper mines of the world. This is the Toquepala mine and another mine nearby. Drilling had almost been completed by the end of 1951, and it appeared that the large scale development of the property would be necessary. The scheme would cost more than $75,000,000, part of which the International Bank or the Export-Import Bank would probably be asked to supply.

LEAD.—Speaking last week at the annual meeting of the Lead Industry's Association in Chicago, Dr. Zimmerman, editor of *The Daily Metal Reporter*, asserted that the industry now faced a lead surplus. In his view, it was only the fact that the suspended import duties on lead would be re-imposed, if the domestic average price fell below 18c., which was keeping the market as steady as it was. At this same meeting, Mr. Sawyer, Vice-President of Ciro de Pasco Corporation, revealed that Peruvian mine production was expected to reach about 80,000 tons this year and he said that in a few years time he expected it to be up to about 100,000 tons. Mr. Meachin, of the St. Joseph's Lead Co., told the meeting that St. Joe's Aguilar Mine, the Argentine's only present producer, was now not producing more than about 15,000 tonnes a year, against a figure of 26,368 tonnes in 1940. Development of the Argentine's lead-zinc industry was being severely hampered by the restrictions on the importation of plant and machinery. Mr. Meachin also pointed to Eastern Morocco as an area which promised to become one of the maior lead and zinc producers in the world given freedom from political unrest. The Société des Mines de Zellidja had, he said, increased production of lead and zinc some twelve-fold and other mines were affecting substantial production increases.

No change in the official U.K. price of lead has been announced, despite expectations that the Ministry would have to bring the price more into line with prices ruling outside the U.K. The price of Mexican lead has improved very slightly, having risen last week from 18.08c. per lb. f.o.b. Monterey to 18.11c.

The quantity of refined copper imported into the U.S. in February was over double the amount imported in January: the quantities were 23,297 s.tons against 10,221 s.tons.

TIN.—There has been little clarification of the Bolivian position since last week, except a reiteration of the Government's intention to nationalize the tin mines. The new Minister of Mines and Oil has said that nationalization will bring proportionate compensation, and that it will cover the properties of the three great mining enterprises—Patino, Hochschild and Aramayo.

The Bolivian Government has also stated that the nationalization measure will not apply to medium sized mines, which means that, among others, Fabulosa Mines will not be taken over.

The Administrator of the R.F.C., Mr. Harry Macdonald, hopes for an early agreement with Bolivia over tin supplies. He said that the R.F.C. was on the point of making an offer to Bolivia when the Revolution overthrew the Government. He refused to deny that the offer would have been 121¼c. per lb. landed, the same price as offered to the U.K., the Belgians and the Indonesians. He asserted, however, that Bolivian tin was still going into the U.S. "from other sources"; the price of 121¼c. per lb., so he stated, was providing everyone with a profit.

World mine production in February is estimated, by the International Tin Study Group, at 12,500 tons compared with 13,100 tons in January. Stocks in the United Kingdom and Malaya at 13,700 tons and 8,500 tons respectively showed an increase on the previous month. United States consumption of tin for January, the latest month for which figures are available, was 4,879 tons, compared with a monthly average for 1951 of around 5,125 tons.

Output of Malayan tin-concentrates in terms of metal converted at 75.5 per cent was 4.735 tons during March.

ZINC.—The New York price of slab zinc will be raised to 20.33c. per lb. as a result of an increase in the domestic freight rates.

Movements of slab zinc in the U.S. were much larger in February than in January: imports were 5,179 s.tons against 4,329, and exports leaped up to 3,773 s.tons, against 1,972 tons. Zinc ore imports at 36,062 tons were also larger: this compares with 33,836 tons in January.

ALUMINIUM.—So far, the U.S. Government's search for responsible American business interests to support a third round of aluminium expansion has not been conspicuously successful. Mr. R. S. Reynolds Jnr., president of Reynolds Metals, has said that his company is ready to match the recent proposal by Canadian producers to supply 1,500,000 s.tons of aluminium to the U.S. during 1955-59. Mr. Wilson, president of Aluminum Co. of America, has told shareholders that the $330,000,000 expansion programme has been progressing; the annual capacity should be up to 500,000 s.tons by the end of the present year and 625,000 s.tons by the end of 1953. He also gave shareholders two warnings: first, the general aluminium situation is softening because the military programme has been extended over a longer period, and secondly, the company might need a price increase of one cent and possibly two cents per lb. This possibility would become stronger if the steelworkers receive the wage claims they have lodged, since Alcoa had been faced with demands little different from those made on the steel industry.

World aluminium production in 1951 shows a substantial increase over 1950, which was itself a record. Excluding

U.S.S.R. and satelite countries, production last year was in the neighbourhood of 1,735,000 s.tons, compared with about 1,400,000 s.tons in 1950. Production in U.S.A. at 837,000 s.tons, Canada at about 469,000 s.tons and France at 100,000 s.tons all showed substantial increases. The most notable advance during the year was in German production which rose from 31,000 s.tons in 1950 to 82,000 s.tons in 1951. European countries are currently producing around 20 per cent of the world's production compared with some 65 per cent which is accounted for by Canada and the United States.

CHROME.—The Turkish Government are understood to be negotiating for the delivery of 100,000 tons of chrome to the United States.

NICKEL.—The U.S. National Lead Co. has acquired a majority interest in the Nickel Processing Co. which operates the Government owned nickel plant at Nicaro in Cuba.

Higher production costs in New Caledonia have caused the French "equalization" price of pure refined nickel to be increased from Fcs. 595 to Fcs. 775 per kilo.

QUICKSILVER.—The U.S. price of quicksilver continues to subside gradually: the latest movement has brought the price down by $2 to $202-204.

The price position of quicksilver will be further weakened by the assertion by Mr. Jess Larson, head of D.M.P.A., that the U.S. has stocks "believed adequate to take care of foreseeable domestic and military requirements." The increases in the price which had occurred when quicksilver was scarce had caused domestic production to expand. Last year domestic production rose 58 per cent above the 1950 figure totalling 7,156 flasks compared with 4,535 flasks. Mr. Larson thought that there was no need for government assistance to help production to expand still further, but D.M.P.A. would encourage domestic exploration. The consumption of mercury in the U.S. was 56,600 flasks last year.

The London Metal Market

(From Our Metal Exchange Correspondent)

Except for one day when an appreciable tonnage of prompt metal changed hands turnovers on the London Metal Exchange have been at a minimum, and it appears as though this state of affairs will continue so long as the Eastern price continues to fluctuate within the very narrow limits of the last week. Demand in the U.K. and Europe is of a very modest nature, but the general opinion is that buyers need not enter the market more actively for some time to come.

The free copper market shows signs of falling back and copper with payment in sterling is now valued at £355-£350 per ton f.o.b. With payment in dollars the price is now 35-37¼c per lb. f.o.b. Europe or f.a.s. U.S. ports depending on the delivery date. The zinc market is absolutely featureless and the value is between £155 and £165 per ton, f.o.b. Europe. With payment in dollars some metal can be bought on basis of the E. & M. J. quotation. The lead market is slightly better as the very low offers appear to have been absorbed and the value is now £140 to £145 per ton f.o.b. There is no interest for metal with payment in dollars.

On Thursday the official close on the tin market was: Settlement price £965 10s., Cash Buyers £965, Sellers £965 10s.; Three months' Buyers £966 10s., Sellers £967. In the afternoon the market was unchanged. Turnover for the day was 260 tons. Approximate turnover for the week was 865 tons.

The Eastern price on Thursday morning was equivalent to £972 5s. per ton, c.i.f. Europe.

Iron and Steel

Iron and steel consumers are now more or less resigned to the prospect of acute stringency until the end of the half year. It is true that a few small consignments of steel from U.S.A. and Japan have helped to expand to some small extent the tonnages available for distribution, but it is not expected that arrivals from overseas will attain substantial proportions until after midsummer and it would certainly be premature to visualize an early increase in the allocation.

On the whole the main consumers appear to be tiding over present difficulties in a reasonably satisfactory manner. In many cases it is still possible to make good shortages in current supplies by making further raids upon stocks. This of course is an unrepeatable expedient, but is justified by the promise of ample supplies later in the year.

There seems to be faint hopes of more scrap—at least from overseas. If there be any increase in the supplies of scrap reaching the steel norm and the foundries it must come in the main from home sources, and in spite of many discouragements, the home scrap drive is being prosecuted with unabated vigour.

Ore supplies are now coming to hand in adequate tonnages to meet the needs of the blast furnaces but the quality of some of the imported material is not beyond criticism. Coke on the other hand is still barely adequate for ironworks needs and it is mainly the fuel shortage which is holding up the further expansion of pig iron production. The primary objective is the provision of more basic iron for the steel plants but the foundries are also pressing for more iron. They have plenty of work in hand, but the output of castings is governed to some extent by the deliveries of pig iron and scrap.

No. 3 foundry iron is not so scarce as haematite and low and medium phosphorous grades whilst refined iron makers have little scope for the acceptance of further orders for prompt delivery.

Both the light re-rolling mills and those engaged on heavy steel products are handicapped by the scarcity of ingots. Most of the mills are still working a reduced number of weekly shifts on this account and are therefore reluctant to add to their commitments. Moreover, home requirements are so heavy that the export quotas have been cut though considerable tonnages are due to be shipped this quarter under bi-lateral trade agreements.

APRIL 24 PRICES

COPPER

Electrolytic	£231 0 0 d/d

TIN

(See our London Metal Exchange report for Thursday's prices)

LEAD

Soft foreign, duty paid	£163 0 0 d/d
Soft empire, including secondary lead ...	£163 0 0 d/d
English lead	£164 10 0 d/d

ZINC

G.O.B. spelter, foreign, duty paid ...	£190 0 0 d/d
G.O.B. spelter, domestic...	£190 0 0 d/d
Electrolytic and refined zinc	£194 0 0 d/d

ANTIMONY

English (99%) delivered, 10 cwt. and over	£340 per ton
Crude (70%)	£275 per ton
Ore (60% basis)	37s. 6d./40s. nom. per unit, c.i.f.

NICKEL

99.5% (home trade)	£454 per ton

OTHER METALS

Aluminium, £154 per ton.	Palladium, £8 10s. oz.
Bismuth, 25s. lb.	Platinum (scrap), £33.
Cadmium, 18s. 3d. lb.	Platinum, £27/33 5s. nom.
Chromium, 6s. 5d. lb.	Rhodium, £45 oz.
Cobalt, 20s. lb.	Ruthenium, £30 oz.
Gold, 248s. f.oz.	Quicksilver, £73/£73. 10s. ex-warehouse.
Iridium, £65 oz. nom.	Selenium, 25s. nom. per lb.
Magnesium, 2s. 10¼d. lb.	Silver (bar), 77d. f.oz. spot and forward.
Osmiridium, £35 oz. nom.	Tellurium, 19s. lb.
Osmium, £70 oz. nom.	

ORES, ALLOYS, ETC.

Bismuth	30% 7s. 9d. lb. c.i.f.
	20% 5s. 6d. lb. c.i.f.
Chrome Ore—	
Rhodesian Metallurgical (lumpy)	£13 per ton c.i.f.
,, ,, (concentrates)	£13 per ton c.i.f.
,, ,, Refractory	£12 12s. per ton c.i.f.
Baluchistan Metallurgical ...	£14 16s. per ton c.i.f.
Magnesite, ground calcined ...	£26 - £27 d/d
Magnesite, Raw	£10 - £11 d/d
Molybdenite (85% basis) ...	103s. 1¼d. per unit c.i.f.
Wolfram (65%), U.K. ...	485s. nom. c.i.f.
Tungsten Metal Powder (for steel manufacture) ...	35s. nom. per lb. (home)
Ferro-tungsten	33s. nom. per lb. (home)
Carbide, 4-cwt. lots	£30 3s. 9d. d/d per ton
Ferro-manganese, home ...	£43 15s. 2d. per ton
Brass Wire	2s. 8¼d. per lb. basis.
Brass Tubes, solid drawn ...	2s. 1¼d. per lb. basis.

THE MINING MARKETS

Stock markets opened the week under the shadow of the impending £150,000,000 British Electricity Authority issue. But once the terms had been announced the market recovered from its unsettled condition, no selling pressure eventuated and the funds, which had been marked down earlier, recovered a large proportion of their losses.

Although Kaffirs began the week heavy and closed on the same note, in the interim period they were definitely trying to go better. This was partly due to the feeling that the South African political situation was improving and partly due to Mr. Havenga's statement in the House of Assembly that he appreciated the need for everything to be done to find the huge sums of capital still needed for development in the Orange Free State and that he would do nothing to hinder the securing of that capital. On balance, however, price changes among producers were small. In the Far Western Rand group Stillfontein shed 7½d. to 23s. 6d. and Doornfontein fell 3d. to 23s. 3d. despite the imminence of the quarterly report. Western Reefs was also easier following news of the capital increase.

O.F.S. issues were particularly dull although President Steyn improved on the week at one time going as high as 13s. 10½d. before reacting to 13s. 9d. This movement was attributed to the fact that the options to subscribe for the company's convertible notes expires next week.

The announcement that Southern Rhodesia would give depletion allowances of 10 per cent for gold mines, 5 per cent for base metal and coal mines and that the gold industry would be allowed to sell the whole of its production on the premium markets acted as a fillip to the leaders in this section. Cam & Motor, Falcon and Globe & Phoenix all hardened. The granting of the depletion allowance to the Colony's mines brings Southern Rhodesia's laws more into line with those existing in Canada and the United States. In fact, when the Finance Minister, Mr. Whitehead, was explaining his proposal he said that the absence of such a provision in the Colony's taxation code was a major deterrent to investment of North American capital in the country's mines.

In an otherwise indifferent West African market, Ariston responded modestly to the higher interim payment. Of miscellaneous golds Yukon were a firm spot. Buying was reported to be from Canadian sources. Rosterman also improved on the news that they had acquired new interests.

A strong feature in the finance section was South West Africa which spurted to 3½ before easing to 3-11/32; buying was associated with the interest held in the exploration adjacent to the Tsumeb property. Anglo American remained under the shadow of the new issue and at the end of the week finished lower. General Mining also slipped back but Hendersons Transvaal were firm.

Coppers opened irregular but at the close of week were generally firm. Rio Tinto was, however, the outstanding feature in this section and following the all-round improvements in its results jumped 2¼ to 24½. The price was later steady at 22½.

Tins improved where changed. Beralt advanced 6d. to 24s. in anticipation of a second interim, Southern Kinta went better, while Petaling at 15s. 6d., showed a favourable reaction to the interim payment. Elsewhere buyers came in for Geevor encouraged by the hopes of the revision in E.P.L.

In diamonds De Beers went easier in front of the full report but finished the week higher at 62s. 10½d. "Casts" were firm on interim dividend anticipations and also ended the week higher at 34s. 1½d.

Oil issues were generally good. Shells were the centre of attraction, the consistent buying being prompted by the hope of bumper profits for 1951 and by hopes of a higher final dividend. Burmah's too, were a good market, due largely it was believed to switching out of Anglo Iranians. Ultramars, however, were an indifferent market and finished the week lower at 32s. 3d.

FINANCE	Price Apr. 23	+ or − on week
African & European	2½	
Anglo American Corpn.	6½xdxr	−⅛
Anglo-French	19/-	−1/3
Anglo Transvaal Consol.	30/-	−2/6
Camp Bird	11/6	+4½d
Central Mining (£1 shrs.)	35/-	
Consolidated Goldfields	47/6	−7½d
Consol. Mines Selection	26/10½	−7½d
East Rand Consols	3/1½	
General Mining	4½	−⅛
H.E. Prop	32/6	
Henderson's Transvaal	11/9	+6d
Johnnies	3⅜	
Rand Mines	4⅜	−⅛
Rand Selection	38/1½	+1½d
Union Corporation	8⅛	−¼
Vereeniging Estates	1¼	
Writs	29/6	−1/-
West Wits	43/9	+1/3
RAND GOLD		
Blyvoors	40/6	−1/-
Brakpan	15/-	−3d
City Deep	36/3	−7½d
Consol. Main Reef	35/-	
Crown	52/6	+7½d
Daggas	3⅛	−⅛
Dominion Reefs	1/10½	−1½d
Doornfontein	23/7½	+1½d
Durban Deep	3⅜	
E. Daggas	20/7½	+1½d
E. Geduld ... (4/- units)	41/10½	−2/7½
E. Rand Props	3⅜	−1/7½
Geduld	6¼	
Grootvlei	31/10½	−2/1½
Libanon	13/6	+6d
Luipaards Vlei	18/6	+3d
Marievale	20/6	−9d
Modderfontein B.	5/6	
Modderfontein East	30/-	+1/3
New Kleinfontein	29/4½	
New Pioneer	13/3	+6d
Randfontein	19/6	−3d
Robinson Deep	12/6	−6d
Rose Deep	28/9	
Simmer & Jack	6/1½	−3d
Springs	8/-	+1½d
Sub Nigel	2½	
Van Dyk	11/6	−6d
Venterspost	20/6	
Vlakfontein	17/6	−4½d
Vogelstruisbult	25/3	−6d
West Driefontein	6⅛	−⅛
W. Rand Consolidated	46/10½	−1/10½
Western Reefs	39/4½	−1/10½
O.F.S		
Alpha F.S.A.	6/3	+3d
Blinkpoort	16/10½	
Central Mining F.S.	3/6	
Freddies	7/3	+1½d
Freddies N.	6/3	
Freddies S.	8/-	+6d
Harmony	18/6	−3d
Lydenburg Estates	9/4½	7½d
Middle Wits	16/1½	+7½d
Ofsits	38/1½	+1½d
President Brand	14/-	−6d
President Steyn	14/-	+1/6
St. Helena	17/-	−7½d
U.F.S.C. & G.	6/3	−3d
Virginia Deb.	9/6	
Virginia Ord.	9/9	
Welkom	28/9	−9d
Western Holdings (New)	3½	−⅛
WEST AFRICAN GOLD		
Amalgamated Banket	1/6	
Ariston	5/9	+1½d
Ashanti	19/4½	−4½d
Bibiani	7/-	
Bremang	2/7½	
G.C. Main Reef	3/3	−1½d
G.C. Selection Trust	6/1½	−3d
Konongo	2/7½xd	−1½d
Kwahu	4/-	−3d
London & African Mng.	1/6	−1½d
Lyndhurst Deep	1/1½xd	−1½d
Marlu	1/6	−1½d
Nanwa	5d	
Taquah & Abosso	4/1½	−1½d
AUSTRALIAN GOLD		
Boulder Perseverance	2/3	
Gold Mines of Kalgoorlie	9/9	
Great Boulder Prop.	5/3xd	
Great Western Consol.	6/10½	
Lake View and Star	17/-	+1/-
Mount Morgan	15/9	+2/-
North Kalgurli	13/-	+3d
Paringa	6d	
Sons of Gwalia	10/-	+3d
South Kalgurli	8/4½	
Western Mining	7/4½	+1½d
Wiluna	5/7½	
MISCELLANEOUS GOLD		
Cam and Motor	38/1½	+1/10½
Champion Reef	7/3	−3d
Falcon Mines	8/3	+3d
Globe & Phoenix	25/6	+9d
MISCELLANEOUS GOLD (contd.)		
G.F. Rhodesian	6/3	
London & Rhodesian	5/-	+1½d
Motapa	2/-	+3d
Mysore	4/6	
New Guinea	1/4½	+1½d
Nundydroog	5/6	−3d
Oregum	2/9	−3d
Oroville	11/-xd	
St. John d'El Rey	30/-	−1/3
Zams	38/-	+9d
DIAMONDS		
Anglo American Inv.	4⅞	−⅛
Casts	33/9	+2/-
Cons. Diam. of S.W.A.	4	−¼
De Beers Defd. Bearer	64/-	−9d
De Beers Pfd. Bearer	14⅝	−½
COPPER		
Chartered	58/9	−1/9
Indian Copper	3/9	+3d
Messina	3⅜	−⅛
Nchanga	6⅜	−⅛
Rhod. Anglo-American	54/6xd	−1/-
Rhodesian Selection	16/7½	+4½d
Rhokana	19½xd	−⅛
Rio Tinto	23½	+2½
Roan Antelope	12/-	3d
Selection Trust	40/-	+2/6
Tanks	54/9	−2/-
Tharsis Sulphur Br.	46/3	+2/6
TIN (Eastern)		
Anglo-Burma	2/9	−3d
Ayer Hitam	25/6	−1½d
Bangrin	9/6	
Gopeng	12/3	−6d
Hongkong	8/6	
Ipoh	23/-	
Kamunting	11/10½	+10½d
Kepong Dredging	7/7½	+9d
Kinta Tin Mines	14/6	
Kramat Pulai	4/10½	
Malayan Dredging	23/9xd	+2/-
Pahang	15/6xd	
Pengkalen	9/9	
Petaling	15/4½	
Rambutan	12/6	−1/3
Siamese Tin	21/9	
Southern Kinta	15/1½	+3d
S. Malayan	24/9xd	+1½d
S. Tronoh	17/6	+6d
Sungei Kinta	17/6	−7½d
Tekka Taiping	9/-	−3d
Tronoh	25/3	
TIN (Nigerian and Miscellaneous)		
Amalgamated Tin	9/3	
Beralt Tin	23/6	+9d
Bisichi	3/7½	−1½d
British Tin Inv.	17/-	+7½d
Ex-Lands Nigeria	5/1½	−1½d
Geevor Tin	12/1½	+10½d
Gold & Base Metal	3/9	−3d
Jantar Nigeria	5/6	+7½d
Jos Tin Area	11/-	
Kaduna Prospectors	4/-	−3d
Kaduna Syndicate	5/4½	+1½d
London Tin	5/9	+1½d
Ribon Valley	1/-	−1½d
United Tin	2/6	
SILVER, LEAD, ZINC		
Broken Hill South	47/6	+3/3
Burma Mines (3/6 sh.)	2/1½	+1½d
Consol. Zinc	25/6	+9d
Lake George	17/6	+3d
Mount Isa	37/-	+1/6
New Broken Hill	24/3	
North Broken Hill	59/6	+9d
Rhodesian Broken Hill	16/6xd	−9d
San Francisco Mines	35/3	+1/6
Trepca	3/6	
MISCELLANEOUS BASE METALS & COALS		
Amal. Collieries of S.A.	46/3	−1/3
Associated Manganese	40/9	−2/3
Chinese Engineering	4/-	+1½d
C.P. Manganese	53/9	+3/3
Natal Navigation	3⅜	
Wankie	16/6	
Witbank Colliery	2⅜	−⅛
CANADIAN MINES		
Dome	$34½	
Hudson Bay Mining	$96½	−$3½
International Nickel	$78	−$½
Mining Corpn. of Canada	£5⅜	+£⅛
Noranda	$136	−$5½
Quemont	£7⅛	−£⅛
OIL		
Anglo-Iranian	5⅜	−⅛
Apex	43/9	
Attock	23/3	
Burmah	64/4½	+7½d
Canadian Eagle Bearer	35/6	+3/6
Mexican Eagle	21/9	−4½d
Shell	4⅜	+⅛
Trinidad Leasehold	30/6	
T.P.D.	30/-	+1/3
Ultramar	32/4½	+1½d

COMPANY NEWS AND VIEWS

"Geoffries" Acquisitions and Abandonments

General Exploration Orange Free State Ltd. ("Geoffries"), continued, during 1951, its policy of abandoning mineral rights on ground regarded as being of negative value and acquiring options over other areas. Last year approximately 30,944 morgen were abandoned and further mineral rights were acquired over 1,370 morgen. The effect of this was to bring the total of such options held in the O.F.S. at the end of the year to 26,612 morgen.

Additionally, the company exercised options to purchase mineral rights on farms in the Hoopstad and Kroonstad districts which, with those previously held, gives it a total of 5,164 morgen. It also has 2,650 morgen held under freehold title, and participation in vendor and subscription rights with joint option holders in a further 2,900 morgen in various districts.

During the year drilling continued on several farms, particularly on Tevrede of Spes Bona and Van den Heever's Rust, as well as on Weltevreden, Rosedale and others. It will be recalled that gratifying results were obtained on some of these farms last year and drilling results are tabulated in "Geoffries" annual report.

The company's finances are satisfactory. The issued capital was increased last year when the Anglo American Corporation subscribed in cash for 500,000 shares at 24s. each. The effect of this is shown in the Balance Sheet at December 31, 1951, where share premiums figure at £537,046. The excess of outgoings over income was £7,432 and the debit balance carried forward is £31,942. An amount of £56,104 was written off for options abandoned, drilling, prospecting, etc., and £511,034 went to General Reserve. There is a cash balance of £354,902.

West Rand and Uranium

Of the comparatively few Rand producers, known so far, which are erecting plants for the recovery of uranium, West Rand Consolidated promises to be the first to reach production. The 1951 annual report states that it is anticipated the plant will be in production in the sceond half of the current year, and an undertaking has been given by the Company to investigate the possibility of expanding output immediately operations start.

Meantime, the mine's gold production during 1951 was satisfactory, as were developments. The mill dealt with 2,537,000 tons against 2,602,000 tons, recovery being 3.184 dwt. (3.251 dwt.). Revenue was better at 41.47s., compared with 40.99s., but costs increased from 24.56s. to 25.87s., and the working profit per ton of 15.60s. went against 16.43s. in the previous year. This resulted in a slight set-back in the total profit to £2,137,143 compared with £2,291,979. Taxation called for less, £800,504 (£1,001,396), and the Ordinary dividend was increased from 2s. 9d. to 3s. which with the Deferred payment absorbed £850,000.

Development totalled 77,044 ft. and represented a decrease of 8,631 ft. The footage of work was distributed over the Main, South, Livingstone, Bird and Kimberley reefs. A comparison of the combined Main and Kimberley series shows that there was an improvement in value and pay ratio. Bird reef development, on which most work was done, showed little change in pay percentage but improvement in value.

Work was commenced during the year with the sinking of a three-compartment shaft from the 47th level. Good progress was made with construction work at the new West Reduction plant which, it is anticipated, will commence in the latter half of 1952.

Robinson Deep's New Development Programme

With the abandonment of the big project visualized in 1947 for extending the mine much further in depth and opening up large new areas, the technical advisers have agreed on another programme. It has now been decided that the best interests of the mine will be served by limiting work on the South Reef to known pay zones and by concentrating development on the opening up of the intact tonnage on Main Reef Leader to the limits which can be served by the existing shaft facilities. The Chris and Turf incline shafts are to be deepened and a development scheme carried out which will make this ground available for stoping as rapidly as possible.

More development was accomplished last year, although the footage sampled was less, and the pay ratio slightly down. 26,821 ft. were driven against 23,047, of which 12,390 ft. were sampled, giving 48.7 (53.5) per cent payability of an average value of 6.1 dwt. against 4.8 dwt. the previous year. The drop of 1,374,000 tons in ore reserves to 2,010,000 tons was due both to elimination of lower grade ore by rising costs and to the necessity of discarding other ore located in isolated areas which, under present conditions of cost and labour, are no longer profitable to mine.

The mill dealt with 1,350,000 tons or 35,000 tons less than the previous year and the yield of 3.161 dwt. compared with 3.281 dwt. Revenue was 41s. 4d. against 41s. 6d. and costs increased by 2s. 6d. per ton to 37s. 5d. The result was a big drop in working profit per ton from 6s. 6d. to 3s. 10d. and in the total from £455,466 to £261,755. Taxation was much lower—£34,637 against £111,100, and the dividend was reduced to 2s. against 2s. 6d., absorbing £200,000.

Simmer & Jack's Satisfactory Operations

The opening up of new ground, facilitated by the South Deep Vertical Shaft and the two incline shafts put down on Simmer & Jack, gave satisfactory results last year. Developments were good and showed an increase in both percentage payability and value. Exploratory work in the old upper areas of the mine has also given encouraging results and a large proportion of the tonnage crushed during the year was obtained from this source.

The mill dealt with 1,508,000 tons or 19,500 tons more, the yield being 3.180 (3.205) dwt., and revenue 41s. 6d. against 40s. 6d., but the benefit of this was entirely lost with an increase of 1s. per ton in costs to 34s. 10d. Working profit per ton was very similar to that of the previous year—6s. 8d., though the effect of the higher tonnage and bigger yield coupled with a greater amount received from premium gold sales, was reflected in the working profit which was £13,900 higher at £507,053. This enabled the dividend to be maintained at 8d. per share, absorbing £225,000. Taxation called for more at £81,441.

The footage of development was lower—45,650 against 51,252 as was that sampled—26,705 (30,420) ft. but the pay ratio was higher—38.8 per cent compared with 32.5 per cent and the value substantially better, 5.4 dwt. per ton over 47.8 in. (4.4 dwt. over 46 in.). For the third year in succession ore reserves were down, and at 2,739,000 tons, show a decrease of 266,000 tons, value and stope width remaining unchanged—3.8 dwt. over 48.1 in. Good progress has been made on the 59 and 60 levels and with the completion of ancillary work, lateral development in this area will be accelerated.

Rietfontein's Steady Record

Although Rietfontein Consolidated is one of the minor gold producers on the Rand—and the smallest of the Gold Fields group—its profit record over the past five years has been one of consistent increases. Milling has been stepped up gradually as likewise revenue although, as with all mines, working costs have increased.

The mine is situated to the north of those which adjoin one another along the reef; its nearest neighbour being Wit Gold (Knights), positioned about two miles to the south. It is underlain by a series of four reefs known respectively as South, Middle, Main and North Reefs. They have been worked for about eighteen years, yielding good tonnages of ore, and in order to obtain all the payable reef, a programme of reclamation was initiated some years ago. Exploratory development and stoping in the upper levels and in the old eastern section have given gratifying results. In order to facilitate operations in the north-western section, the sinking and equipping of No. 5 Incline shaft has been extended which has resulted in development and stoping operations in this area being accelerated. Shortage of labour hampered underground work last year and the footage of development was only 19,690 compared with 21,247 ft. in the previous twelve months. The pay ratio of the

9,710 ft. sampled (12,345) was lower at 38.9 per cent (45.9), and value of 7.7 dwt. went against 8.6 dwt.

Tonnage milled showed an increase of 2,500 at 326,500 tons, as likewise the yield 4.45 (4.33) dwt. Working costs rose by 2s. to 32s. 8d. per ton but, although they were higher, the working profit showed an increase of £25,104 at £414,992, due to higher yield per ton and gold premium. Taxation was much higher at £215,904 and the dividend had to be reduced to 3s. against 3s. 3d.

"Vogels" Continued Expansion

The combination of increased tonnage, higher grade ore and larger amount received from gold premium during 1951, enabled Vogelstruisbult Gold Mining to again add to its sequence of consistent improvements. Tonnage crushed last year of 929,000 tons was the highest so far and showed an increase of 35,000 tons over that of the previous year. Yield per ton of 5.046 dwt. compared with 4.897 dwt. and revenue per ton of 66s. 1d. went against 62s. the previous year. The additional amount was more than sufficient to offset the increase of 3s. 5d. per ton in costs to 41s. 10d., and working profit of £1,125,369 was the best since the start of milling in 1937. This enabled the best distribution so far to be made—2s. against 1s. 10½d. the previous year. More was required for taxation—£475,465 against £398,937.

Development results were again satisfactory and showed a slight increase in percentage payability and value when compared with the previous year. Footage was 50,494 (against 52,734), and of the 34,235 ft. sampled, 48.4 per cent (47.4) proved payable, the value being 6.3 dwt. (6.2 dwt.). Ore reserves were again built up and at 3,125,000 tons are the highest yet established; they show an increase of 28,000 tons over the previous year's computation, value being unchanged, 5.5 dwt.

Work has gone ahead in connection with the fourth unit of the reduction plant. This, it will be recalled, was decided upon in 1950 as a result of the encouraging developments of the Kimberley Reef. Delay has been experienced in delivery of the equipment but it is anticipated that the additional plant will start up during the first half of the current year. Provided sufficient power and labour is available, milling rate will be gradually increased to full capacity—100,000 tons per month.

Rio Tinto Shows All Round Improvement

The consolidated profit and loss account of Rio Tinto for the twelve months ended December 31, 1951, records results which are in striking contrast to those obtained in the previous year.

The net return on sales of produce, etc., advanced from £559,348 to £1,042,850 while net investment income more than doubled, going ahead from £369,689 to £778,019.

After providing for all charges, including taxation, depreciation, etc., net profit for the year jumped from £271,559 to £961,814. Dividend payments aggregating 35 per cent, tax free (12½ per cent, tax free) absorbed £743,750 and after servicing the 5 per cent preference shares and taking into account all other appropriations, the carry forward at the fiscal year-end was £1,128,157 against £958,439 brought in.

The vastly improved results achieved by the company during 1951 was due largely to the improved income received from its substantial investments in Rhodesian Copper mining companies, and also from mining operations in Spain, which have shown a decided improvement. Moreover, the directors state that it has been possible to remit a portion of the profits to the United Kingdom. It is hoped that by the end of the current year the volume of these remittances will have been increased considerably.

On the other hand, the prices fixed by the Spanish authorities for the company's pyrites, copper and sulphur, which it sells in Spain, are still unremunerative in relation to production costs and in certain instances are below production costs. However, the price now being obtained for its pyrites exported is ta such a level that the company is actually making peseta profits and these profits have been reflected in the Pounds Sterling profit and loss account; which explains the increase in the trading profits.

Commenting on the exploration work carried out in conjunction with the Frobisher Company of Canada at Kilembe, Uganda, the directors state that considerable capital will in all probability have to be found for the development of this project and that the bulk of these funds would most likely be forthcoming from North America. Consequently, the company has reduced its direct holding in the Kilembe venture, but has taken an indirect interest by acquiring shares in the Frobisher Company.

De Beers Big Profit Expansion

Gross revenue of De Beers Consolidated Mines for the twelve months ended December 31, 1951, showed an expansion of £2,852,289 to £15,788,565 in spite of a decline of £404,445 to £8,850,726 in the diamond account. However, this relatively modest drop was more than offset by increased dividend income from its associated companies which jumped from £3,101,388 to £6,293,760.

Mining expenditure called for £2,544,825 (£2,276,015), general charges amounted to £159,518 (£132,064) while interest on capital of leased companies needed £145,667 (£147,513) and tax liabilities absorbed £2,600,000 (£2,500,000), leaving a net profit of £10,338,555 compared with £7,880,684.

The Deferred dividend, as previously announced, was raised from 110 per cent to 200 per cent. The preference dividend of £1, together with the Deferred dividend distribution required a total of £8,960,172.

The directors state that proceeds realized during the year from the sale of diamonds effected through the Central Selling Organization on behalf of South African and other producers and diamonds drawn from stocks held by the Diamond Corporation, reached a new record level of £65,057,965 compared with £50,967,041 which was itself a record.

Quoted shareholdings stand in the latest balance sheet at £5,342,778, having a market value of £9,194,042.

British Aluminium's Profit Expansion

The increased activities of The British Aluminium Company for the twelve months ended December 31, 1951, was reflected in the consolidated profit and loss account and the group balance sheet for the twelve months ended December 31, 1951.

The consolidated trading profits, after a revision in the basis of stock valuation amounted to £3,404,506 against £2,185,435 in 1950. Income from investments improved from £29,248 to £41,365, giving a total consolidated income for the year of £3,445,871 against £2,191,496 in 1950.

Taxation at £1,524,974 was more than double the previous year's liabilities of £749,485 and after providing a total of £1,112,081 (£810,012) for depreciation, plant replacements, interest, etc., net profit for the year was £808,816 compared with £631,999 of which £17,550 (£12,578) was attributable to outside shareholders in subsidiaries.

General reserve was strengthened by the allocation of £144,696 (£141,170) and tax equalization reserve by the transfer of £109,432 (£105,662). Debenture redemption in reserve received £3,885 (nil) while the sum of £31,240 (£40,000) was provided for development expenditure. In addition to maintaining the dividend at 10 per cent the company distributed a bonus of 2 per cent (nil) which required £362,250 (£247,500), and after crediting to contingencies reserve £9,806 (£9,690) the carry forward at the fiscal year-end totalled £939,381 against £809,424 brought in.

The balance sheet as at December 31, 1951, showed that total net assets of the group stood at £22,920,088 compared with £20,292,127. Net current assets improved from £6,578,662 to £8,640,278, while fixed assets at £12,566,580 compare with £12,241,664. Investments have also increased, and are recorded going ahead from £1,450,180 to £1,713,230.

Reserves amount to nearly £10,900,000 and provide protection against raw material price fluctuations and provisions for future tax.

Outstanding contracts for capital expenditure are estimated at £792,521 against £931,444.

Mr. R. W. Cooper is chairman, the annual meeting will be held on May 6.

TRANSVAAL CONSOLIDATED LAND AND EXPLORATION CO. LTD.

(Incorporated in the Union of South Africa)

AUTHORISED AND ISSUED CAPITAL—£465,119 in 930,238 Shares of 10/- each

The Report and Accounts for the year ended 31st December, 1951, contain, interalia, the following information:

PROPERTY—The Company's holding of farm property and mineral rights in the Transvaal at the 31st December, 1951, was as follows:—

Freehold and Mineral Rights	117,235 acres
Mineral Rights only	3,423,906 ,,

together with interests with other Companies in sundry freehold and mineral rights in the Pilgrims Rest and Rustenburg districts of the Transvaal and the freehold of 34,345 acres of residential plots in townships, sold in leasehold, in the Johannesburg Municipal Area.

The total area of farm land sold was 58 acres, and six leasehold stands were converted to freehold.

SHARES AND DEBENTURES—These investments stood at a book value of £369,457 a net decrease of £5,435 compared with the total at the end of the previous year. All shares appeared in the books at or under cost, but in no case above market price at the 31st December, 1951. The market value of these investments largely exceeded the book value shown in the Balance Sheet.

MINERAL INTERESTS

A first and final liquidation distribution of 2s. 4.65d. per share has been received in respect of the Company's shareholding in Holfontein (T.C.L.) Gold Mining Company, Limited.

Tributes—The royalties derived from properties let on tribute totalled **£73,459** mainly in respect of the working of asbestos, chrome and tin deposits.

Rietfontein (T.C.L.) Mine—The property remained on a caretaking basis.

Platinum Prospecting Association No. 3—This Association, in which the Company has a 45 per cent interest, completed its drilling programme on the farm Boschkoppie No. 685, Rustenburg, in August, 1951. This programme has proved that the major portion of the farm is underlain by the Merensky Reef and, in view of the encouraging values intersected in the boreholes, it was decided to undertake further investigation of the property by means of a limited scheme of underground exploration, in order to obtain further essential information as to the nature of the deposit. Good progress has been made with the erection of the necessary buildings and plant and by the end of the financial year underground work had started.

OPERATIONS

Van Dyks Drift Colliery—The quality of coal produced during the year has remained consistently high and mining conditions generally have been good.

Due to inadequate railway facilities the Colliery, in common with other collieries, has found it necessary to restrict output, and coal has mainly been produced from only five of six available districts. The Colliery's output tonnage and revenue were adverseley affected by the Government embargo on the export of coal which has been in force since July, 1951.

Capital expenditure during the year amounted to **£28,851.**

CASH AND INVESTMENTS

The net Cash and Cash Assets at the end of the year amounted to **£300,642** made up as follows:—

Mortgage Bonds and other Securities		£50,147
Plant, Stores, etc.		55,008
Debtors and Payments in Advance		34,408
		£139,563
Deposits, Cash, etc.	£416,112	
Less:		
Liabilities (other than those of a contingent nature)	£243,554	
Abnormal Costs Reserve	11,479	
	255,033	
		£161,079
		£300,642

PROFITS AND APPROPRIATIONS

Balance Unappropriated as per Balance Sheet, 31st December, 1950		£194,357
Balance of Profit and Loss Account for the year ended 31st December, 1951		237,904
Transfer from Shareholders' Contingency Reserve		1,400
		£433,661
This amount has been dealt with as follows:		
Taxation	£7,582	
Dividend No. 29 of 1s. 9d. per share	81,396	
Forfeited Dividends Account	1,418	
		90,396
Leaving a balance unappropriated of		£343,265

The full Report and Accounts may be obtained from the London Secretaries, A. MOIR & CO., 4, London Wall Buildings, E.C.2.

Company Shorts

Central Provinces Manganese Distribute 50 Per Cent Tax Free.—In a preliminary statement Central Provinces Manganese Ore announce that the profit for the year 1951, after providing for all the charges, including taxation, was £643,387 as against £514,971 the previous year. The reserve for U.K. income and profits tax and for Indian taxation, before arriving at the above net profit figure was £1,257,500, compared with £1,250,000 in the preceding year.

At the annual meeting to be held on June 4, the company will recommend the payment of a final dividend of 2s. and a bonus of 2s., both free of tax per 10s. stock unit, making, with the interim dividend of 1s., free of tax, 50 per cent, tax free for 1951 compared with 35 per cent tax free for the previous year. This will absorb a total of £500,000 as against £350,000 in 1950. After providing for the dividend distribution, taxation, all other expenses, and allocating £100,000 to general reserve, £20,000 to the staff benefit fund, and £10,000 to the workers' welfare fund, the carry forward was £185,067 as against £176,357 brought in.

'Frisco Pays 60 per cent on Doubled Capital.—San Francisco Mines of Mexico is recommending the payment of 60 per cent for the year ended September 30, 1951, on the £2,056,813 capital as increased by the 100 per cent bonus issue. This distribution compares with 70 per cent for the preceding year on the smaller capital.

The preliminary statement also reports that the gross value of the company's products realized £9,560,647, which includes £169,463 in respect of previous years, compared with £7,986,485. Mining and milling charges totalled £1,741,259 (£1,730,478). Smelting, refining and marketing, after crediting £233,386 in respect of previous years, amounted to £4,331,889 (£4,063,692) and after providing for all other expenses, including taxation of £22,415,651 (£1,340,541), net profit for the year was £1,022,310 an increase on the previous year's earnings of £203,935.

From the £1,198,737 available, £50,000 was placed to exploration and development reserve and £225,587 to re-investment reserve. The dividend will absorb £647,896 (£377,939) and the amount to be carried forward will be £270,254.

The annual meeting will be held on May 16, dividend warrants will be despatched on or about May 22. Mr. C. E. Temperley is chairman.

Gold Coast Consolidated Lands Strengthen Their Reserves.—The report and accounts of Gold Coast Consolidated Lands which includes West African Mines and Estates for the year ended June 30, 1951 disclosed that the mineral output from the Gold Coast Consolidated Lands group amounted to 143 tons tin and 28½ tons columbite compared with 137½ tons tin and 25¾ tons columbite in the previous year.

Despite the higher output of both metals, which realized £134,010 against £76,854, the dividend distribution remained the same as in the previous year, namely 3 per cent for Gold Coast Consolidated Lands and 1 per cent on the ordinary shares of West African Mines and Estates, and 7 per cent on its preference shares. However, reserves were strengthened by the allocation of £15,000 bringing that account up to £24,452. The building up of the reserve account is urgently advisable, the directors state, in order to counteract the gradual depletion of that part of the ore reserves which stand in the company's property accounts at £57,420. The carry forward at the fiscal year-end amounted to £41,528 as against a mere £2,403 last year.

The annual meeting will be held at Buckhurst Place, Wadhurst, Sussex, on May 15. Mr. George Parkins is chairman.

Rosterman's New Acquisitions.—Rosterman Gold Mines have announced that they have acquired about a 30 per cent interest in two development syndicates, one of which is exploring for wolfram in Uganda, and the other which has an exclusive prospecting licence from the Kenya Government over a body of graphite between Nairobi and Mombasa. The company's present investment totals approximately £4,000.

The directors state that they are satisfied that further explorations and development of the company's mine in Kenya are unlikely to yield economic results.

GENERAL EXPLORATION ORANGE FREE STATE LTD.

(Incorporated in the Union of South Africa)

AUTHORISED CAPITAL	£1,000,000
ISSUED CAPITAL	£668,125

DIRECTORATE:

SIR GEORGE W. ALBU, Bart. (Chairman).
E. L. LLOYD. C. S. McLEAN. T. W. T. BAINES. I. SHAFFER. G. V. R. RICHDALE.
K. C. ACUTT. S. R. FLEISCHER, C.B.E., D.S.O., M.C. G. H. R. EDMUNDS.

EXTRACT FROM REPORT AND ACCOUNTS FOR YEAR ENDED 31st DECEMBER, 1951

CAPITAL—During the year under review 500,000 Reserve Shares of 2s. 6d. each were issued at a price of 24s. per share. The Issued Capital of your Company at December 31, 1951, was, therefore, £668,125 in 5,345,000 shares of 2s. 6d. each, all of which have been converted into Stock, transferable in multiples of 2s. 6d.

ACCOUNTS—The net Share Premium received on the issue of 500,000 Reserve Shares has been taken to Appropriation Account together with the balance of £30,092 at December 31, 1950, on Exploration Reserve. From the resultant figure of £567,138 there has been written off £51,864 expenditure on abandoned option contracts covering drilling prospecting and option monies and £4,240 from Investments to reduce the book value to market value at December 31, 1951. These adjustments leave a balance of £511,034 which has been transferred to General Reserve.

ACQUISITIONS AND ABANDONMENTS—Owing to no favourable indication having been obtained as the result of drilling, mineral right options covering approximately 30,944 morgen were abandoned. Further mineral right options over 1,370 morgen were acquired in the Bothaville District, and at the year end the total area of such options held in the Orange Free State amounted to approximately 29,612 morgen. Of this total, an area of approximately 27,400 morgen is situated in the Bothaville and Kroonstad Districts, in respect of which agreement has been reached for the joint exploration and possible exploitation of this and adjacent areas held by Central Mining Free State Areas Ltd., Transvaal Mining & Finance Co. Ltd. and Lydenburg Platinum Ltd.

Dr. BALANCE SHEET at 31st DECEMBER, 1951 Cr.

1950 £		£	£
	Share Capital—		
	Authorised:—		
	8,000,000 Shares of 2s. 6d. each, convertible into Stock	1,000,000	
	Issued:—		
	5,345,000 Shares of 2s. 6d. each, converted into stock and transferable in multiples of 2s. 6d.		
605,625			668,125
	Share Premiums—		
233,210	Net amount received on issue of 500,000 shares during 1951	537,046	
233,210	Less Transfer to Appropriation Account	537,046	
—			—
—	**General Reserve**		511,034
	Exploration Reserve—		
30,092	Balance at December 31, 1950	30,092	
	Less Transfer to Appropriation Account	30,092	
			—
110,108	**Creditors**		10,701
£745,825			£1,189,860

1950 £		£	£
	Properties & Mineral Rights, at cost—		
133,074	Balance at December 31, 1950	133,074	
	Additions and Improvements during 1951	28,507	
	Transfer from Option and Participation Rights	14,141	
			175,722
	Option and Participation Rights—		
67,208	Balance at December 31, 1950	67,208	
	Expenditure during 1951	28,604	
		95,812	
	Less: Options abandoned, net 17,205 Transfer to Properties and Mineral Rights... 14,141	31,346	
			64,466
	Drilling and Prospecting—		
132,812	Balance at December 31, 1950	132,812	
	Expenditure during 1951	63,351	
		196,163	
	Less: Amounts written off for areas abandoned in 1951	34,659	
			161,504
	Investments—		
376,217	At cost or Market Value, whichever the lower		371,977
	Motor Vehicles, at cost, less amounts		
160	written off		229
183	**Office Furniture and Fittings,** at cost		183
5,406	**Debtors**		28,935
	Cash—		
	On Deposit at Call with General Mining & Finance Corporation Ltd., at Bankers and on hand		354,902
24,510	**Appropriation Account**		31,942
£745,825			£1,189,860

Copies of the Full Report and Accounts are available at the London Office of the Company, Winchester House, Old Broad Street, E.C.2

Mining Men

Mr. H. Ashworth-Hope has resigned from the boards of Malayan Tin Dredging, Southern Malayan Tin Dredging, Kramat Pulai, Tronoh Mines, Southern Tronoh, Ayer Hitam Tin Dredging, Sungei Besi Mines and Kepong Tin Dredging.

Mr. D. E. Baird has been appointed deputy chairman of the Durham Divisional Board of the National Coal Board in succession to Mr. R. S. Barrett.

Mr. L. Chamberlain has been appointed a director of Base Metals Mining Corporation to fill the vacancy caused by the death of **Mr. A. P. Earle.**

Mr. A. E. Leveson has been appointed a director of Consolidated Mines Selection.

Sir Norman Mighell has been appointed a director of Consolidated Zinc Corporation.

Mr. William Smith has been appointed deputy chairman of the Scottish Division of the National Coal Board in succession to **Dr. William Reid.**

The National Industrial Safety Conference, organized by the Industrial Safety Division of the Royal Society for the Prevention of Accidents, will be held at Scarborough from May 16 to 18.

The Massachusetts Institute of Technology will hold special summer courses in Surface Reactions in Flotation and in Chemistry and Mechanics of Moulding Materials.

The special course in Surface Reactions in Flotation will be held from June 9 to June 13, and the special programme in Chemistry and Mechanics of Moulding Materials will be held from September 1 to September 6.

International Metallurgical Conference in Austria.—The first international post-war metallurgic seminar will take place from June 22 to June 26, 1952, in Reutte, Tyrol, under the auspices of the United States High Commissioner, Walter J. Donnelly, and the Austrian Minister for Education, Dr. Ernst Kolb. The conference will be held under the sponsorship of the American Electro Metal Corporation, Yonkers, New York, the Metallwerk Plansee, Reutte (Tyrol), Austria, and Metro-Cutanit Ltd., London, England.

Metal and Mineral Trades

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